

THE SOCIETY FOR THE ADVANCEMENT
OF
JOURNAL
MANAGEMENT



Conference Papers on
Production Planning and Control
A New Technique in Executive Training
The Regulation of Competition
Time Studies in Commercial Research Work
and
The Larger Aspects of Industrial Engineering

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JANUARY, 1936

VOL. I, No. 1

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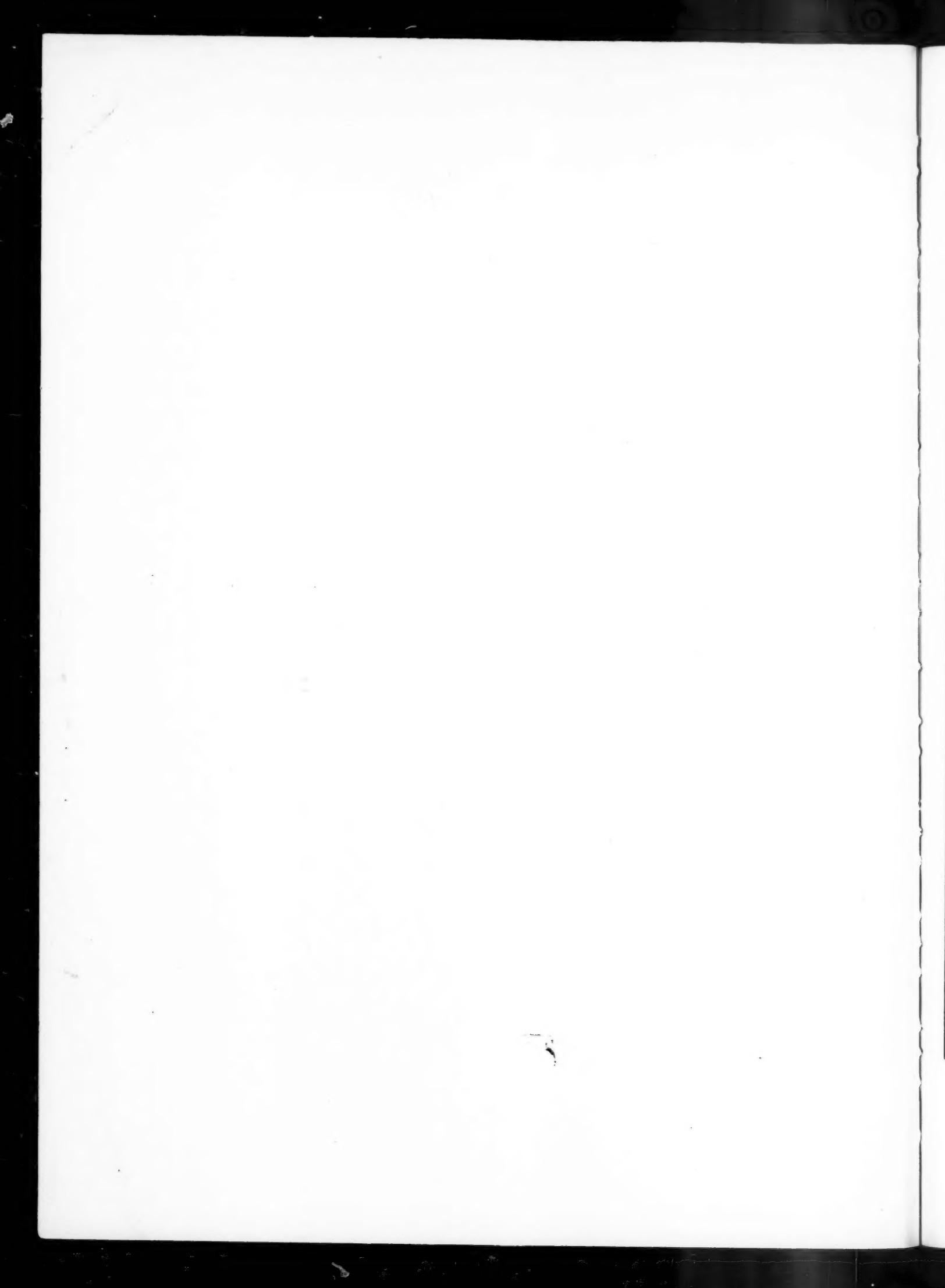
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Comment

THE SOCIETY FOR THE ADVANCEMENT OF MANAGEMENT, INC., begins its active career with this new Journal—Volume One, Number One. It brings together into a common membership the former memberships of the Taylor Society and The Society of Industrial Engineers, which have been operating cooperatively under the name of the Federated Management Societies for the last eighteen months.

It brings together an initial membership of approximately a thousand members with excellent prospects of an early accession of several hundred members.

It consolidates the resources of two societies with vigorous traditions of loyal service to the management movement.

It prospectively makes possible a greater degree of activity both nationally and locally in public enlightenment and in the stimulation of executives on the whole range of problems which relate to effective management in a time of transition.

It should now be possible to do a more sustained job in publication of useful material, in research into management problems, in public educational gatherings and in personal service to members supplying information and in acting as an informal clearing house for employment possibilities.

As its name implies, this Society aims to *advance* the science and art of management; not merely to reiterate old truths or to accept present principles and methods as final solely because they have worked in the past.

This mandate to advance implies two things. It implies bringing more corporate managements and executives up from the rear guard into awareness and use of the best modern methods. And it implies pushing out into pioneer territory our exploration of new management problems in relation to new and changing economic and social conditions.

Here is a dual responsibility each half of which is equally important to the growth and vigor of our Society.

And thus early in our united career a word of warning and a counsel of patience are perhaps in order. For there will be those members who will claim that we do not pay enough attention to educational efforts which help to bring the rear guard into camp. Or, to put it in other terms, there will be those who say that more should be done for the staff and line executives at the lower levels of management.

(Continued on page 2)

(Continued from page 1)

There will be, equally, those who say that not enough is done in the exploratory and experimental field where principles are being re-examined, hypotheses being re-tested, and practices being re-appraised.

Both tasks are vital. Both are equally essential to the fulfillment of our unique aim.

It is to be hoped that time will prove that our Society by its various functional activities (under functional vice-presidents) can both minister to and point the way for both types of members.

It is always worth remembering that unity does not mean uniformity, that singleness of ultimate aim does not preclude variegated ways of seeing the aim and of working for its realization. It might well be a grave mistake if our efforts at unity in the management movement proved successful at the price of a static and complacent idea that management meant and should mean the same thing to all, and the same thing yesterday and tomorrow.

If the breathless transitions in which we all have shared since 1914 show nothing else they surely indicate that diversity of outlook upon the nature of management problems and upon the lines to be followed in solving them are wholesome and necessary. Management is in flux and not final in content. It is also in acute need of constant review in relation to its larger economic and social setting.

Management as science and art is a *social* science and art. It shares with the other social sciences the need for a grasp of objectives, principles, and methods which relate them to *human* concerns. The apparatus of the social sciences is different from that of the physical sciences. As yet this truth is too little appreciated. It is different for many reasons, but fundamentally because the test of *what is true* is far less easily determinable than in the physical sciences. And the possibility of validation of what is true by actual experiment is far less easy. For what is true in social, human concerns (such as those of management) is not quickly discovered or proved. "In the long run" is always the qualifying factor in evaluation of management methods scientifically viewed.

Management will earn the rank of a science, and managers will earn the right to be true professionals, only when they view their labors as ministering to society and to the social good in the long look.

Industrial engineers, production engineers and staff managers can be members of a profession (see Professor Rautenstrauch's able article in this issue); but the

price they pay for this distinction is a real one. It is the price of knowing what is good in management principles and practice for society as a whole and of struggling for, and if need be, sacrificing for that greater good.

Low cost does not always equate with professional integrity. High profit is not always the sign of enlightened management. There is an ethical and moral factor which we ignore at our peril.

It is the recognition and definition of a professional standard and of an ethical obligation which are the true justification for a management society today—and for our Society.

Let us do everything possible in this new alliance to bring the less well equipped up to the best known practices of today.

But let us also not forget that we are always moving forward to tomorrow—to new problems and new conditions.

Let us aim straight but aim high.

Let us help to make management a real profession. And on this platform—

Long live the Society for the Advancement of Management!

IN ADDITION to consummating the creation of a new Society to take over and extend the activities of the two societies which were the constituent members of the Federated Management Societies, the annual meetings in December, 1935, also achieved a high level of excellence in program content, in enthusiastic attendance and in general support for new developments.

As usual the aim was to cover topics of interest to executives from various points of view and in various functional fields.

It was inevitable with the increasing involvements of business with national regulatory and legislative enactments that attention should be paid to this phase. Internal production management was considered from a number of useful angles. Sales management and distributive phases were splendidly handled with the co-operation of the American Marketing Society. The luncheon conference for teachers was a highly stimulating occasion under Professor Dutton's leadership.

The dinner was both gay and informing. John Carmody and Glenn Bowers gave accounts of their public stewardships.

The registration exceeded that of any year since 1930; and another year should witness another large increase in attendance and interest.

Production Planning and Control¹

By T. M. LANDY

General Electric Company, Schenectady, N. Y.

PRODUCTION Planning and Control as we know it in the General Electric Company is co-ordinated management which like engineering has become an exact science. This routine I am about to describe is applicable to the small plant or to the various departments of the large plants.

Organization

Logically the first thing in any system or routine is organization. No routine or system of management is better than the people operating that routine or system. Likewise once the proper people are installed on the job they must be given the proper authority as well as responsibility to do their job. Hence much thought should be given not only to the placing of the right people on the various jobs in connection with production planning and control activities but likewise setting up their job so they can properly perform the required duties and functions.

The organization set-up, as shown on the following chart seems to place authority as well as responsibility. It likewise attempts as far as possible to eliminate unnecessary overlapping of duties, functions and responsibilities.

For real results all planning and control activities should come under one man—logically the Production Supervisor, who should be held responsible for the following activities: scheduling, inventory control (raw stores and finished stock), machine tool and expense tool activity, wage rate and motion study, planning, ordering, preparation of paper, maintaining, dead load, *dispatching*, moving of material, following of requisitions, material utilization and shipping.

The chief bone of contention seems to be as to whether the dispatchers shall report to the foremen or to the Production Control Supervisor. It is now agreed by those who have tried both methods that the *dispatchers should report to the Production Planning and Control Supervisor. Under no circumstances should the dispatchers report to the foremen.*

The second supervisor should be placed in charge of the manufacturing group, that is, general foremen, sec-

tion foremen, direct workers, expense workers and tool crib attendants.

These two supervisors report to their superintendent or department manager with a close tie-in with the engineering and accounting groups.

It is our earnest hope that we will be able to have the variable budgets set up based on this organization lineup and that eventually we will have definite standards of measurement on all the various indirect expense activities herein contained.

The Plan

We now have the centralized organization. The next step is the plan.

The complete plan falls into three very logical divisions, namely: 1. Planning, 2. Performance, 3. Accounts.

Under Planning falls scheduling, engineering to drafting planning and pricing, tools, preparation of paper work, placing of outside orders, tool cribs, raw material stock, inventory records and the dead load file.

Starting with the requisition we will trace through a component part.

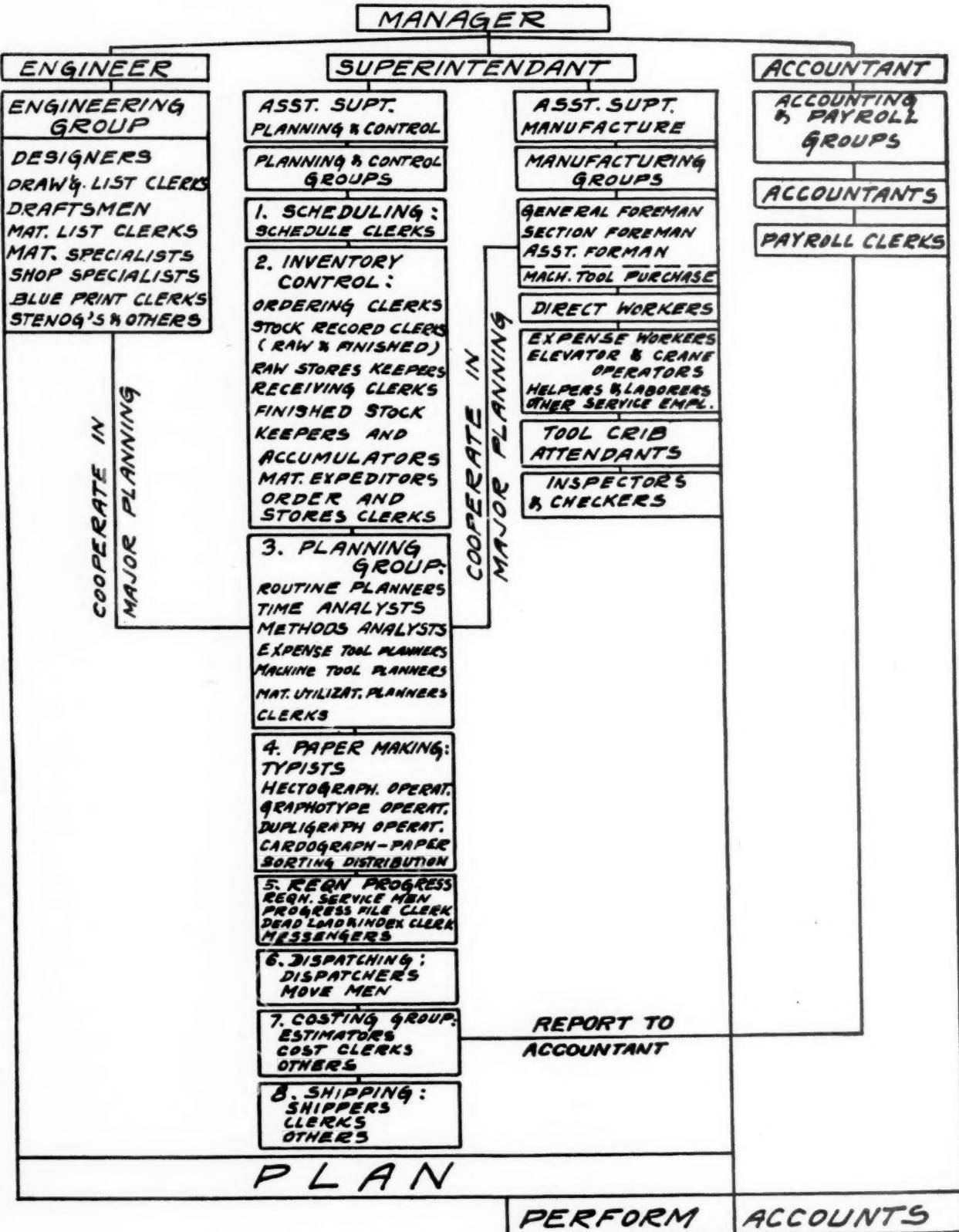
The first thing done after the receipt of the requisition is the preparation of a schedule chart. Starting and finishing dates are hereon assigned to all component parts, sub-assemblies and final assemblies as well as material, prints and planning. In other words once this chart is agreed to every one must follow it: the engineers and draftsmen as well as planners, shop, cost, production, test, purchasing, and transportation. Perhaps one of the greatest evils in the past has been that of the engineers and draftsmen taking too great a percentage of the total time and the shop trying to make up the lost time.

These schedule charts must be prepared for each requisition where the manufacture is extremely special. For the standard or semi-standard lines the charts can be prepared ahead of time for each line, marked off in units of time. One of our Works has forty charts for the complete line of apparatus.

The important thing to remember about these charts is that the engineers and draftsmen are definitely

¹ Paper presented at a meeting of Federated Management Societies, New York, December 5, 1935.

Departmental Organization



1. Planning

Complete preparation of schedules, specifications, orders, tools and materials

1a. Schedule Committee

Representing: engineering, drafting, planning, production, shop, testing, purchasing, transportation, cost.

1b. Design and Specification

Drawings: material specifications: tools, jigs, fixtures, moulds, patterns, punches, dies, etc.

1c. Combined Schedule and Material List

Detailed schedule for each individual group and part, specifying quantity and routing.

1d. Planning and Pricing

Specifying operations, routine and labor prices for each separate operation on each part.

1e. Duplication of Orders

Hectograph or addressograph method.

1f. Orders Placed Outside of Department

Orders & Stores Dept., Foundries, Unit Cost Depts., outside vendors.

1g. Tool Crib

Stock of uncataloged and expense tools.

1h. Raw Material Stores

Storage of all incoming material.

1i. Inventory Records

Record of authorizations, receipts, withdrawals, finished stock on hand, raw material on hand and on order.

1j. Dead Load File

Orders awaiting receipt of materials, tools, drawings, specifications, or scheduled date to start work.

2. Performance

Manufacture and Finished Stock

2a. Index File

Record of orders entering work shop.

Records: Location of orders, material, tools and prints.

Classifies: 1. Overdue orders by causes.
" 2. Current orders.
" 3. Future orders.

2b. Work Shop

Control and dispatch cage.

Delivers and receives orders to and from work stations as per pre-planned schedule including all direct

labor, inspection, testing, transportation. Also records labor costs, changes and extras. Compiles load charts vs. performance.

2c. Requisition Progress File or Production Followers

Checks progress of schedule and accumulations by requisition number or job on M.L. Expedites shortages and late parts.

2d. Finished Stock Room

Stock keeping of:

accumulations for assemblies and of authorized stock for future orders.

3. Accounts

3a. Accounting Dept.

Factory investment, property and inventory, operating statistics, budgets, overhead burden.

3c. Cost Dept.

Accumulate and recapitulate individual order cost record cards.
Accumulate and recapitulate individual order material withdrawals.
Summaries of material and labor by complete units and requisitions.
Participate in planning for economy in costs.

Contribution to Cost Accounting

1. Analysis of work into functional units and their relationships.

events they record and analyze. Errors and waste are promptly discovered in time to be corrected. Post-mortems and hind sight cease to be the rule.

2. Operations are planned and conducted by means of written documents, not by arbitrary verbal orders; making each document automatically an original record of each unit of activity and an original record of performance and cost accounting; eliminating the cost of duplicate records and errors.

4. When for special purposes post-mortems are required, they can be made accurately and promptly from the original and actual unit operating date, identifying each movement and operation as to time and cost.

3. The original document or individual order serves both for operating and cost accounting control, permitting the cost accounts to be routined and synchronized with the

5. As a consequence promptness of obtaining costs and expenses accurately related to men, workplaces, operations, jobs, materials, inventory, extra cost, waste, etc., is all due to technique and system of modern management.

scheduled and that time is allowed for planning as well as work in the shop.

A copy of the schedule is distributed to the various interested parties.

Based on the dates given on the schedule the drafting sections start the preparation of drawings (the method to be described is now rapidly being adopted throughout the company).

As the draftsman makes the tracing he makes out a bill of material longhand on a separate piece of paper (yellow copy). Gross sizes of material are specified per unit by the draftsman and likewise all stock items are listed as such by (S. F.).

The next step performed is the advance ordering of tools and material, such as winding forms, shafts, commutator copper, etc., or anything special. Next the draftsman's original (yellow copy) is passed to a typist who types a master copy and one or more hectograph master copies. Inspection is made and they are now ready for release. The master copy remains with the tracing and from them blueprints are obtained. The hectograph master is sent to the Planning Section where detailed schedule is entered and then passes on to the inventory control records where a prewrite-off of material is made and ordering of material is done. Any substitutions of material are recorded on this hectograph master only. The master copy in the drafting department is not changed. No substitutions may be made without the permission of the drafting head, thus placing material specification definitely in the hands of the engineering department.

The hectograph master is now duplicated and copies are made for the planners, stock accumulators and a cost summary sheet for the cost department. It will be seen that since any substitutions made were recorded on the hectograph master before being duplicated all copies made from it will show all changes and substitutions. Hence, the cost department receives a copy of the *actual* material used rather than the theoretical. We are now ready to start the actual planning and pricing of the orders.

From the planner's copy of the material list planning cards are removed from the file or if there is no card one is headed up by the file clerk and together with a print is passed to the planner. Based on a floor layout with each work station numbered he sets up the planning card. It contains the drawing number, material, sequence of operations, operations, machine tools, small tools and work station numbers, operation prices and set-up prices, accumulation, instructions and any other

special data which will be of assistance to the foreman and operator.

Since the foreman is party to the floor layout and the numbering of the work stations of his section he is part and parcel of the planning.

Any material utilization activities should be fitted in with the planner as well as cost estimating.

When the planning card is complete, an addressograph plate is prepared or a hectograph original order is typed in those sections not using addressograph.

From the addressograph plate or from the hectograph original a complete set of paper is duplicated, material orders, identification tag, stock delivery, labor vouchers, cost card, move card, tool check, accumulation copy, etc.

Those sections using tabulating equipment simply substitute tabulating cards in place of the above-named pieces of paper.

The first time the addressograph plate is set up a master record is sent to the tool crib and two master planning records for the planning office file (one filed by drawing number and the other by part name). On repeat orders these copies are not made.

We will now briefly trace the various pieces of paper. The cost card is sent to the dispatch station where it is filed in the dead load (inactive orders). The material book is sent to the source of material.

The accumulation copy is sent to the stock room which must make the accumulation.

The stock room record is sent to the stock room which will make the accumulation.

The dispatch order and a complete set of time vouchers are sent to the dead load file.

The production progress copy is sent to the progress file.

The tool check is sent to the tool crib and the blueprint copy to the central blueprint file. (We maintain one blueprint file for a department or small works.) All these various copies are filed by starting date so that every one is working to the same end. Nothing is done *ahead of time* and everything must be finished *on time*.

We now come to the second division of the plan, that is Performance.

Under this division we have all the manufactured and finished stocks, the master index which records location of orders, material tools, and blueprints, and classifies 1, overdue orders by causes, 2, current orders, 3, future orders.

When the proper date arrives the blueprint is removed from the file (the blueprint copy remains as the

charge) and is sent to the dead load file where it is joined with the labor vouchers and dispatch order.

The tool check is checked against the tool crib master record. Tools are accumulated in the crib or delivered to the work station which is to perform the work and the check is marked "O.K." and sent to the raw material stores.

Upon the receipt of the tool check and the arrival of the starting date the material is delivered into the shop to the first work station and the tool check is delivered to the dead load.

We now have the material at the work station and the print vouchers and tools ready. The papers are now passed over the master index and released to the dispatch cage. The cost card is moved from the dead load to the live load file where it now serves as an index. The first work station number is circled and the voucher and print are placed on the dispatch board in the proper pocket. The workman comes to the dispatch cage, asks for a job on work station number so and so. He is given the voucher and print clocks it in, and returns to work station where the material and tools are waiting.

The dispatch order and the balance of the vouchers are placed in the upper pocket of the dispatch board showing that the job is in process. When the workman completes his job, he has the voucher signed by the foreman and returns his voucher and print to the dispatch cage where he clocks in the voucher. The dispatcher gives the workman a new voucher and print and he returns to his work station as before. The dispatcher posts the voucher against the cost card, sends the voucher to the payroll and places the print on the balance of vouchers and moves them into the lower part of the pocket representing the next work station. He then issues a move card moving material to the next work station and the tools back to the tool crib. This same cycle is repeated until all the vouchers are exhausted.

(It will be seen that this eliminates peak loads in the payroll department since the vouchers are flowing to the payroll constantly.) The blueprint is sent back to the master file where the blueprint charge is destroyed.

The dispatch order is stamped "complete" and sent to the requisition progress file.

The cost card is stamped "complete," passed over the master index, which is destroyed, and the cost card is sent to the cost department.

All the cost department has to do is to make the proper extensions, add the overhead and these cards now represent the cost.

These cards are then posted on the cost summary sheet previously delivered. This routine makes costing much simpler and less expensive and makes it possible to cost jobs an hour after completion. Customers can be billed the day of shipment. The dispatcher then issues a move card moving tools to tool crib and the material into the stock room.

The stock delivery is removed from the tag by the stockkeeper and posted on the stock room record previously received on the initial distribution.

The routine of the requisition progress man is as follows:

On the initial distribution a pink copy is received and filed by shop order; also a copy of the material list and an accumulation notice copy for each sub-assembly and assembly.

When raw material is received, a material available copy (golden rod) is sent to this file and the pink copy is destroyed. Then when the part is finished the white dispatch order stamped complete is sent by the dispatcher and the material available copy is destroyed.

Hence when the file has changed from pink to white, all parts are complete, and the material list is released to the proper stock room with the accumulation notice. When the accumulation has been made the accumulation notice copy is sent to the dead load to release the proper papers to perform the necessary work on the sub-assembly or assembly involved. (On repetitive lines this routine is obviously omitted.)

Getting back to the shop end, when any planning changes are necessary, a recommendation-to-change-planning form is made out by the foreman, initiated by the planner, passed over the cost card where the change or addition is recorded in red ink, and then passes back to the planning office to change all master records and prepare a voucher.

On any extra cost, that is, operations to be performed on this lot only, an extra cost form is made out and the routine is exactly as above.

All waiting time is issued by the foreman who sends the workman to the dispatch cage to clock off his job and onto waiting time. Likewise it is the foreman's duty to see that the workman is removed from waiting time as quickly as possible. All requests for waiting time are analyzed periodically.

The issuance of small expense tools is likewise controlled by the foreman in the following manner:

A triplicate form is made out for each tool by the workman and signed by the foreman. The three copies

are taken to the tool crib where the original is filed against the workman's name and number, the duplicate is filed against the name and number of the tool and the workman retains the triplicate.

We now know what tools each man has in his possession and we also know where each tool is.

When the workman finishes with the tool, he returns it and the triplicate copy to the tool crib and receives the original copy which clears him.

The duplicate is removed from the tool file and placed in a third file; the triplicate is destroyed. This third file shows expense tool utilization. It is filed by tool name, size and number. Then periodically the slips are analyzed and it can be readily seen whether the expense tool inventory is too low or too high.

Coming back to the inventory control records we have a dual Kardex card set-up for stock items. The white

card is the stock card showing stock movement. The buff card is the combination order and planning card.

When necessary to order a stock item the order card (buff) is removed from the file, the order is entered on it and the card is sent to the planning office as a signal to prepare a set of paper. The card is then returned to the file.

It will be seen that this entire routine is based on three basic pieces of data; namely, the schedule chart, the print, and the planning card. All other papers are copies of one or all of these.

Since so much is dependent on the print, this routine tends to make the engineering department manufacturing and cost minded.

Likewise since the cost department uses a copy of the print and a copy of the planning card to do all the costing, it will be seen that costing becomes a by-product of planning which is a fundamental of good costing.

THE real significance of the machine, socially speaking, does not consist either in the multiplication of goods or the multiplication of wants, real or illusory. Its significance lies in the gains of energy through increased conversion, through efficient production, through balanced consumption, and through socialized creation. The test of economic success does not, therefore, lie in the industrial process alone, and it cannot be measured by the amount of horsepower converted or by the amount commanded by an individual user: for the important factors here are not quantities but ratios: ratios of mechanical effort to social and cultural results. A society in which production and consumption completely cancelled out the gains of conversion—in which people worked to live and lived to work—would remain socially inefficient, even if the entire population were constantly employed, and adequately fed, clothed, and sheltered.

The ultimate test of an efficient industry is the ratio between productive means and the achieved ends. Hence a society with a low scale of conversion but with a high amount of creation is humanly speaking superior to a society with an enormous panoply of converters and a small and inadequate army of creators. . . .

This is why no working ideal for machine production can be based solely on the gospel of work: still less can it be based upon an uncritical belief in constantly raising the quantitative standard of consumption. If we are to achieve a purposive and cultivated use of the enormous energies now happily at our disposal, we must examine in detail the processes that lead up to the final state of leisure, free activity, creation. It is because of the lapse and mismanagement of these processes that we have not reached the desirable end; and it is because of our failure to frame a comprehensive scheme of ends that we have not succeeded in achieving even the beginnings of social efficiency in the preparatory work.

How is this margin to be achieved and how is it to be applied? Already we are faced with political and moral problems as well as technological ones. There is nothing in the nature of the machine as such, nothing in the training of the technician as such, that will provide us with a sufficient answer. We shall of course need his help: but in turn *he* will need help from other quarters of the compass, far beyond the province of technology.

From "Technics and Civilization" by Lewis Mumford, Harcourt, Brace and Company, New York, pages 378-380.

A New Technique in Executive Training¹

By A. B. GATES

Director of Training, Eastman Kodak Company, Rochester, N. Y.

Selection of Method

THE growth of the Eastman Kodak organization from a one man company in 1880 to an organization of nearly 25,000 in the late twenties had been rapid and consistent. In the late twenties the units of organization had increased in number and size to such an extent that many of the executives felt that a formal program was needed to develop and maintain uniformity of application of company policies especially with reference to the problems of supervision.

Early in the company's development the policy was well established of departmentalizing along the lines of product and the nature of the activities, and of placing executive responsibility for results on the person heading up each group of activities. Such an organization set-up makes co-ordination from the standpoint of responsibility for results effective; but in turn as the size and number of units or groups increase it makes it more difficult to get uniformity in the application of policy. This makes it necessary for management definitely to state company policy and also to make sure that those policies are correctly understood and applied by executives and supervisors in the various groups.

After a thorough study of existing supervisory training programs which included inspection trips to companies carrying on foreman conference programs, it was decided that, as far as possible, the line organization should be responsible for any program carried on by the company. This was logical in our organization because the executives and supervisors are held responsible for results which of course include developing and maintaining an adequate working force. On this basis each plant should be responsible for carrying out the program, and if the plant is large enough, each department, or working unit, within the plant should be made responsible for carrying on the work. It was also decided to keep this program as close to the job of getting work done as possible.

Purpose of the Program

It was agreed that the purpose of the program should be to develop a more effective control of operations

¹ Paper presented for Mr. Gates by N. D. Hubbell at a meeting of Federated Management Societies, New York, December 6, 1935.

through creating throughout the organization a uniform interpretation of management's attitude toward the problems arising in getting the work done, and where possible through establishing improved methods of carrying on the work. A better understanding of the reasons back of company policies and procedures will of course fit the employe for promotion when promotion is possible. But the primary aim was to make the employes, especially those on supervisory, staff and similar jobs, more effective in their present positions.

Organizing to Carry On the Program

At the general offices of the company men representing the various branches of the business were selected who could be consulted on matters of policy and who could contribute to the program. The work was started at Kodak Park because it is the largest production unit in the organization. An advisory, or steering committee, was appointed at the Park with a membership of ten which included the executive heads of the various production units as well as the heads of the staff and service units of the organization. The Works Manager is chairman of this committee.

The superintendent of each department then selected the man or men to lead the meetings in his department. And these departmental leaders, together with the superintendents, assistant superintendents, and staff men of corresponding rank in the various departments, were divided into groups of from fourteen to eighteen each. These groups were known as leader groups and the assignment to groups was made so as to insure representation in each group from the various departments and centralized units of the plant insofar as possible. The supervisors of each department were then divided into groups of ten or fifteen each, and each of these groups was led by either the superintendent of the department or by some one appointed by the superintendent.

At preliminary meetings of the steering committee, it was agreed that departmental meetings would be limited to one meeting of not more than two hours duration each week; also that all text material and problems would be reviewed and approved by the steering committee and would be discussed by the leader groups

before they were discussed in the supervisor's or departmental groups. A consolidated summary of the results of the discussions in all of the leader groups, after being approved by the steering committee, would be made available to the leaders before they attempted to develop the material in their own departmental groups. This procedure is meant to insure that any text material prepared will be in line with management's attitude, and also that a uniform interpretation of the application of the principles covered in the text, will be established throughout the plant by means of the discussion of them in the leader groups in each of which was included plant-wide representation.

When those responsible for the program were ready to introduce it, the plant manager issued a letter to the departmental superintendents in which he outlined the purpose of the program and the methods which would be followed. He also emphasized the fact that, although the plan might be termed a "training program," its primary purpose was to develop a uniform interpretation of management's attitude, and to pool the experience of the executives and supervisors in arriving at the selection of the best methods of making management's attitude most effective.

Text Material

It was agreed that each of the subjects to be covered should be presented by a brief statement of the principles and policies involved. This text material should also include case problems, the discussion and solution of which would develop the application of the principles in the supervisor's work.

The selection of subject matter was based on the purpose of the program which as has been stated was to make supervision effective in the control of operations. The first step in any training should always be an analysis of the job to be done. This analysis should develop the standard method which is to be followed. It should also identify the difficulties in the technique which must be mastered by the worker if he is to be effective. As in all other work, there is a technique of management or supervision and there are difficulties which must be mastered if the supervisor is to be effective in directing the activities of others.

In the analysis of the job of supervision it is apparent that most of the causes of ineffectiveness of supervision can be classified under one of three general groups.

1. Insufficient knowledge of the company's aims and

desires or policies as they apply to each class of work and job.

2. Lack of definite knowledge of the individual's responsibility and authority,—that is, the exact scope of his job.

3. And lack of knowledge of inter-unit and inter-individual relationships that grow out of these responsibilities.

The first step, then, in making supervision effective, and one which must be taken before a formal training program is undertaken, is to make provisions to guard against these causes of ineffectiveness. To do this, management, in its organization set-up and in its policies and regulations, must assure certain definite provisions.

1. Each activity must be classified and grouped with other similar or related activities into functional groups.

2. Responsibility for results in each activity and group of activities must be definitely placed and the necessary authority to get results must be delegated to the person made responsible for results. This means that:

a. There must be some one and only one person directly responsible for each activity which must be carried on.

b. There can be no divided, joint or dual responsibility for results.

c. Two persons cannot be responsible for, or have authority over, a given activity, except as one is responsible or subordinate to the other.

3. Definite lines of authority must be established. There must be but one line of authority from each worker or working group to the top of the authority line.

4. Each individual must know his place in the organization. This means that:

a. He must know the nature of the responsibility placed on him.

b. He must know the scope and limits of authority he is expected to exercise.

c. He must know management's aims and desires as they apply to the work for which he is responsible.

d. He must know his relationship to other individuals and groups growing out of his responsibilities.

5. Finally, management must set up such co-ordinating and control plans and units of organization as are necessary to keep the activities in line with management's aims.

This analysis of the problems of management must be carried on in sufficient detail to disclose the nature of

the responsibilities so that each supervisor may be informed as to the exact scope and nature of his job.

A business to be successful, must produce a commodity for which there is a demand or for which a demand can be created. Production must be carried on to meet this demand which is based on the usefulness of the commodity and the use made of it. The demand determines the necessary quality of product to meet customer requirements and in the last analysis it determines the allowable cost. It also determines at what time and in what quantity production must be carried on.

It is thus apparent that management in a manufacturing business is interested in production of a quality, at a cost, in a quantity and at a time which will satisfy the demand. All of these factors have a direct bearing on the actual process of production and the supervisor's responsibilities must include the responsibility for *cost control, quality control and scheduling as to time and amount of production.*

In carrying on the production process, the foreman or direct supervisor directs labor in the use of machinery, equipment and materials in accordance with established schedules, methods and procedures. Every production process involves the direction of the activities of workers and therefore *personnel problems* are important in supervision.

From such an analysis it is apparent that in a study of the supervisors' responsibilities consideration must be given to:

1. The principles of organization and management.
2. Personnel problems (handling the human factors and employe relationship).
3. Cost control (efficient use of equipment, materials and labor).
4. Quality control (holding to established standards).
5. Scheduling (control of quantity and time of accomplishment).

There are several other factors or responsibilities which are commonly thought of in connection with the foreman's duties, such as safety, care of machinery and equipment, house-keeping, control of waste, maintaining methods, and co-operation. It is obvious, however, that these factors run through or affect some one or all of the five major responsibilities and interests which have been enumerated.

Discussion and Use of Text Material

The first unit of the text material is a general introductory unit and has for its purpose the development

of a clear conception of the supervisor's place in the organization, of his general responsibilities and of his relationship to the workers and to upper supervision. The text material for this unit consists of a brief discussion of management, policies, and responsibility, and of the various units of organization such as line, service or facilitating, control, and staff; and of the relationship of these various units. The discussion of the problems in this unit is conducted in such a way as to bring home to the supervisor the importance of policies, the relation of authority and responsibility, and the methods of, and reasons for, their limitation; and thus to develop a clear conception of line, staff, service, and control units of organization, and the relationship between them.

The principles of organization are presented by a brief talk and illustrated by charts which show the growth of the company organization. This presentation illustrates forcibly how, as the organization grew, the like or related activities were divided and subdivided into groups which formed the basis of the present organization. It also illustrates how the necessary supervisors and executives are placed throughout the organization to insure co-ordination of the work, and how and why staff men, staff, service, and control units of organization have been introduced.

This presentation is followed by a general discussion in every group. And from that point on the group meetings of both the leaders and the department foremen or supervisors are conducted on the conference basis. Although a printed statement or text is given to the group members, quizzes on it or other direct school room approaches are avoided. In fact no reference is made to the introductory text material except as some members of the group may refer to it in order to illustrate a point in connection with the discussion of a problem. The discussion is developed from the case problems or situations each of which has several questions set up to bring out the points which should have special emphasis.

The results of the six leader groups' discussion of the problems in each unit are consolidated into a single set of notes organized so that these notes will parallel the presentation of the principles in the text material. These notes are considered carefully by the steering committee, revised when necessary, finally approved and a copy issued to each member of the leader groups. Each leader then uses these notes as a guide in conducting the discussion in his own departmental group. And after discussing the problems in a unit in his own de-

partmental group, he prepares the departmental notes which, if a good job has been done, parallel closely the notes developed by the leader groups. If a department is so large that there is more than one group, the departmental notes are consolidated when the discussion is completed. Each leader issues the consolidated notes to his group and if they include items not touched on by his group, he calls such items to their attention so that if they are not clear, or are not acceptable, the matters can be cleared up before the notes are made a part of the finished text material.

Revisions and Changes in Method of Procedure

The procedure outlined above was followed through the 1931-32, 1932-33, and 1933-34 seasons. The leader groups at Kodak Park had then finished the units on "The Principles of Organization and Management and the Foreman's Place in the Organization," "Personnel Unit," "Salary and Wage Administration," "The Cost Control Series of Seven Units," and the Unit on "Accident and Fire Prevention." The departmental groups at Kodak Park and the groups at other plants were, on the average, one to two seasons behind the leader groups at Kodak Park.

Almost from the beginning of the program the leader groups at Kodak Park, made up principally of upper supervision, considered the problem cases not alone from the standpoint of direct supervision but from the standpoint of management as well. This resulted in the development of much management material which might have been added to the text material. In many cases it developed a much more complete statement of management's attitude than had been available at the time the text was written. Such material was approved by management and, where a knowledge of it was essential to a complete understanding by the foreman of his place in the picture, it was included in the notes. Because of the more specialized experience of the men participating in the departmental groups, it was apparent that much of the material developed in the leader groups could not be developed readily by discussion in the departmental groups. As the groups got into the discussions of cost and quality control this difficulty became more apparent. The plants outside of Rochester had this same difficulty, magnified because the leaders in these other plants did not have the benefit of first-hand participation in the development of the leader notes. This difficulty was also increased even at Kodak

Park as the leader groups got further ahead of the departmental groups.

Management recognized this difficulty but did not want to forego the benefits derived from the management discussions in the leader groups. It also wished to pass on the results of such discussions to the departmental groups and to other plants insofar as this material was necessary to a complete understanding of the supervisor's responsibility in the matter under discussion.

After consulting departmental executives and leaders and management in the other plants it was decided to set up the consolidated Kodak Park leader group notes on each problem in two parts. The first part of these notes is labeled "Management Notes" and includes statements of management's policies covering our attitude toward the type of situation represented by the problem case and also any factual or technical information necessary to an understanding and a solution of the problem. The second and usually the larger portion of the notes is labeled "Conference Notes" and includes the material which should be developed in the departmental groups by conference methods.

It had also been discovered that in many cases to keep the discussion in line the leader was forced to inform the group as to the exact purpose of the problem. This can be done without disclosing a solution of the problem. For example, the purpose of a problem might be "to determine the supervisor's responsibility for, or relationship to, a given situation." If, however, the purpose were stated "to show that the supervisor is responsible for, and his relation to this situation is so and so," there would be no room for discussion as there is when the ideas must be developed.

Beginning in the fall of 1934 all text material was given out as in the past. Then previous to the discussion of each problem the leader gives out the problem including the Management Notes. These notes include a statement of the purposes of the problem and a statement of any company policy or management attitude toward the situation represented by the problem and any factual or technical information essential to the solution of the problem.

These Management Notes are carefully considered by the departmental groups and if in the discussion any additions, revisions or apparently better ideas are developed, these are submitted to management for consideration and if approved are included in the final notes. The group then, by the discussion of appropriate lead questions, develops through conference the solution

of the problem and the application of the principles involved to the problem and then to similar situations in its own work. In reality this use of Management Notes with the problems involves the addition of small supplements or appendices to the text but placed with the problem so that the application is more apparent than would be the case if the same information were made a part of the text.

The same procedure is followed at the other plants except that either the local plant steering committee or the local plant leader groups must go over the Management Notes developed by the leader groups at Kodak Park and make such changes as are necessary to bring the management notes in line with the local conditions. When these revised management notes are approved by the local plant management they are issued to the groups and used as outlined above. This method has added to the interest in the program and has saved time in the discussions.

We have found that in the first unit with initial text material of about twenty pages, twenty pages were added as a result of the discussion in six leader groups. In the second unit dealing in a general way with the problems of directing the personnel, that is, personnel problems of supervision, a text of eleven pages which includes the problems, grew into a total of fifty-six pages; and since the notes really contained the application of the principles to the problems of supervision, it can honestly be said that the groups have really built, or at least helped to build, the statement of company's attitude as to what should be done, and how it should be done in the matters discussed.

The purpose of the text material and Management Notes is to provide a common ground on which to base the discussion. There is little use trying to develop principles which, regardless of the amount of discussion, cannot be changed. We, therefore, have attempted to set forth briefly the fundamental principles back of each company policy under discussion rather than build up a statement of these principles by the discussion of problem cases. We have attempted through this discussion of cases to bring about a uniform interpretation of how the company policy should be applied.

Although this method appears academic and in some ways appears to run counter to the conference program advocated by many, it has built up and maintained the interest of those who have participated in the program, and has resulted in developing in the departmental group meetings, ideas which have in turn established new company policy. And we believe it has all of the

possibilities of a pure problem study program. It has also a decided advantage in saving valuable time in setting up some of the fundamentals without going through the painful and uncertain operation of developing them through pure conference. If we are to judge by the reaction of those participating in the program, it seems to conform more directly to the way their jobs are set up. They feel that in practice management lays down general policy and expects supervision to work out the detailed interpretation and the application.

The text material developed at Rochester, together with the notes of the leader meetings at Kodak Park, are used as a basis for similar programs carried on in our other plants. The leaders in the other plants are brought to Rochester to go through a short series of meetings, similar to those conducted for the leaders at Kodak Park and other Rochester plants. In these the theory and technique of conference procedure are discussed. These leaders also sit in on other meetings of the leaders and departmental groups so that they can get the feel of the thing.

The organization for the work in the other plants is similar except that, because of size, it is not possible to organize the groups along departmental lines. Except for this the programs are identical. The text material is general enough in content so that few changes are necessary. Such changes in text material and Management Notes as must be made are made before they are issued so that in each case the original text and notes resulting from the discussions are the product of the local executives and supervisors.

Before discussing the results accomplished let us review or summarize briefly the features of this program which stand out:

1. The analysis of the job of management and supervision based on the difficulties which must be mastered, and the nature of responsibilities and relationships which must be understood by supervision.
2. Organization of the subject matter along the lines of the major responsibilities of management and supervision, personnel cost, quality and schedule.
3. The use of text to present a statement of management's policies, aims and desires and the limiting of discussion in the supervisors' groups to development of interpretation and application of such policies and where possible and necessary to the revision of existing or development of new policy.
4. The combination of supervisory and management

training in the same program by means of the leader groups.

5. Setting up the responsibility for supervisory training as a function of the line organization makes possible a minimum training staff by having the training done by executives and staff employees in the departments.

Naturally the question rises as to what has been accomplished by this effort. Training is the process of aiding the individual to acquire correct habits of thought and action. The individual's philosophy of life is the result of years of experiences and contacts with other individuals. He cannot quickly change his attitudes simply because he is brought into contact with new or restated ideas. If, however, this new philosophy is tied in with his responsibility for results on his job he can more readily grasp its implications and value and will be more likely to adopt it as his own especially when he participated in setting up the interpretations. This we believe is what has happened as a result of our program.

After the program had been under way for a year or more, staff men said they were having less difficulty in getting things done in the line departments. The line executives on the other hand felt that it was easier to get on with the staff men. What probably had happened was that each had come to a better understanding of the interests and responsibilities of the other. And with an understanding that there can be a community of interest without an overlapping of responsibility or clashing of authority, co-operation is possible.

In an organization in which executive responsibility for results has been placed on the head of each unit of organization and in which staff, service or facilitating, and control units of organization have been set up cutting across the lines of authority, there are many opportunities for clashes of real and assumed authority. Under such conditions the co-operation essential to success between individuals and between units of organization, is not readily forthcoming. Only through complete understanding on the part of each individual as to his own and others' responsibilities can he know the scope of his job and his relationship with others. We believe that our method of approach has brought about a better understanding in these matters and has led to better co-operation throughout the organization.

In an organization in which management has set up liberal policies covering its relationship with its employes, many employe dissatisfactions can be traced to inequalities growing out of unintentional non-uniform interpretation and application of these policies. Only by an active, definite effort to make sure such policies

are uniformly understood can uniformity of application be secured. This is equally true of other policies, rules and regulations. In a discussion of the application of such policies for the purpose of developing a uniform understanding it is inevitable that discrepancies in the statement of policies may be found. Such discrepancies can then be corrected which will lead to a greater probability of uniform application.

Since the program has been under way several plans or changes in plans, including the Rochester Unemployment Benefit Plan in which the Company participated, have been discussed by the leader and foremen's groups before they were placed in operation. In the discussion of the Rochester Unemployment Benefit Plan a copy of the plan was supplied to each member of the groups. After discussing it to clear up any questions, some eight or ten situations were taken and the amount of unemployment benefit calculated to show the application of the plan. The reaction to this explanation was good. Supervisors wanted to discuss in the same way several other plans which had been in operation for some time.

With a change in the Unemployment Benefit Plan due to the New York State Plan going into effect January 1, we shall discuss it in our groups next week so that supervisors will be familiar with it before it is explained in the Company magazine which will be issued the following week. Other plans affecting employes will probably be taken up in the same way, especially in the case of new plans or of changes in existing plans.

Such discussions have not only cleared up many misunderstandings which probably would have occurred but have led to interpretations and changes that would have been necessary after the plans became operative. Such a method also gets the full co-operation of the supervisory staff from the start.

Another benefit has been the bringing of executives and supervisors together so that, through better acquaintance, better understanding and co-operation are possible. The discussions have given upper supervision an opportunity to get a line on promising material both as demonstrated by participation in the discussions and by ability to lead the groups in collective or co-operative thinking.

Many of the executives feel that the better definition of management's attitudes as developed in the leader groups, with no allowance for the benefits derived from the foremen's groups, has more than justified the efforts expended.

The Regulation of Competition¹

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THE proposal to regulate competition is neither new nor strange. It is rather one of those efforts at social adjustment with which the minds of men have been occupied since communal living replaced a vagrant state of being.

Historically the record shows two long established lines of regulatory action. On the one hand is the seller group trying to regulate competition in its own interest. And this movement is always opposed by a consumer interest which endeavors to regulate competition in its behalf. Either movement may be expressed in private action and reaction but each group interest constantly seeks a political expression, claiming as the public interest its own point of view and seeking to impose that view upon the social body.

No matter where one begins the study of economic history, this diversity of interest and antagonistic regulatory process is found at work. I suggest to you at the beginning of this consideration that neither of these warring groups is properly to be designated "the public" nor is the particular interest of either properly to be accepted as "the public interest." Both are special, particular and less than the whole. Neither of them is constant in its personnel content so that neither is characterized by that complete unity of interest which embraces the ultimate welfare of the entire social order. In other words, we may search in vain for a precedent which may be accurately accepted as a regulation of competition in the real sense of the public interest. But it is not an impractical ideal once we commence to think in these terms.

The two warring interests have heretofore spoken and still speak in different terms. The seller-business group has commonly thought, spoken and acted in terms of a restricted or lessened competitive activity. Whereas the opponent group whenever it has obtained the political power to do so, has sought to enforce free or non-regulated competition. Or in other words, it has regulated publicly against restrictive regulation privately conducted. Neither of these divergent points of view has yet perceived its interest to be a part of the whole rather than the complete conception.

These two opposed points of view are as widely sep-

arated in their initial assumptions as are the conditions which gave rise to them. Free competition was the expression of a condition of individual independence and individual or local self-sufficiency. So long as those conditions remain as the prime characteristics of a social order, social control might well be content with maintaining free competition and coercing the individual into independent self sufficiency no matter what the special and particular consequences might be.

But when through an intensified specialization and under the momentum of an almost unlimited energy conversion, the individual independence becomes merged in a complete and complex social interdependence, the changed condition requires a broader vision. The primary requirement of interdependence is co-ordination of effort and objective, co-operation in the execution of plans and purposes, a regulated competition instead of the contradictory play of antagonistic forces which seek primarily the individual rather than the common interest. It is this newly developed interdependence which now distributes with a terrific centrifugal force the consequences of prior economic maladjustments. The rapidity and generality of the catastrophe distribution is in reality the index of interdependence. It not only emphasizes the demand of interdependence for a restatement of the public interest in this field but it measures also the waiting response to an economic solution in the form of a sound and definite public economic policy.

During the last half century of this conflict the business world has been slowly and vaguely evolving the concept of a regulated competition as a system of economic practice instead of and as an escape from the destructive connotations inherent in an unregulated or free competition. This evolution was implicit in the trade association movement with whose history you are familiar. In this field, however, for lack of a definite public economic policy to serve as a standard of action, there has been much confusion and diversity of purpose both private and public. The trade association, always under public suspicion, grasped eagerly at the prospect of legal protection and coherent expression which seemed to exist in the trade practice conference procedure of the Federal Trade Commission. Under this opportunity the regulatory movement advanced rapidly

¹ Paper presented at a meeting of Federated Management Societies, New York, December 5, 1935.

only to find it had been marching down a dead-end road. While this effort proved futile, it was not in vain for it contained the germ of the later NRA codes. And once more, when this later act was passed, under the sanction of governmental approval, the almost irrepressible force of the regulatory movement swept on in a great wave, only to be turned back once more.

To my mind the most significant fact of NRA was its proposed reconciliation of the two historically antagonistic group interests. NRA almost discovered the true public interest in this matter of the regulation of competition and then turned back. The idea was there but it was not comprehended for what it really was. For the first time in our economic history, the dogma of unregulated competition was publicly repudiated and the doctrine of a regulated competition seemingly was adopted as a public policy. And this was based upon a new relationship of producer, consumer and labor as inherently possessed of an interest in common. In effect if not in terms it was recognized that there was a direct causative connection between a regulated competition and employment, wages, purchasing power and a higher degree of social justice. NRA came very close to perceiving the public interest in the round, to the discovery of a new rhythm for the public and private objectives in a regulated competition.

NRA was however, like all the prior legislation in this field, a blind and frenzied beating upon the knees of that dubious deity, Personal Discretion. Its high priests fervently sought for deific revelations but either they did not come or came in such cryptic form that the interpretation at least was human. The Industrial Recovery Act located no economic north, it contained no directions for the navigator or the navigated by which the desired landfall on the coast of Recovery Land might be made. Naturally therefore, it produced a wide variety of experimental regulations and much viewing with alarm. The old diversity of antagonistic group interests came to life again within the organization administering the act. The Consumers' Advisory Board and the Labor Advisory Board once more renewed the old battle with the producer-employer. The almost discovered unity of interest went into the scrap heap. For since the economic policy was a matter of discretion and therefore personal, the final issue was one of personalities. The great discovery was not made and its potentialities were not captured. But it remains as a possibility and a hope. For in this perception which NRA so nearly obtained and only in this perception of an all inclusive public interest in the regulation

of competition lies the possibility of an economic advance toward a higher degree of social justice. It seems necessary to stress the point.

A return to the vague negations of the Sherman law and their more rigid enforcement will no longer meet either the social or economic demands of an interdependent society. Nor will it serve merely to relax these laws for that is merely an evasion of the issue and a postponement of the day of reckoning. The opportunity and the obligation are one, to grasp the clue which NRA almost revealed and in this comprehension of the public interest, to establish an effective legislative implement for its expression.

The project of a publicly regulated competition to be incorporated in the public policy as a statement of legal economics is at the present, under a negative reaction. This of course, derives from the unfortunate administrative and legal history of NRA. And it becomes necessary therefore to arrive at some clearer understanding of what we mean when we say "competition" and what we mean or should mean when we propose its "regulation." If we can arrive at some clearer comprehension of these matters, it is reasonable to suppose that the legalistic formulation of the proposed regulation might well be thrown into stronger relief. And correspondingly the hope arises that the many misunderstandings which now obscure and obstruct the course of this proposal may be removed.

It seemingly should be axiomatic that the regulation of competition connotes the maintenance and improvement of competition. As the antithesis to governmental ownership or control, such a proposal declares boldly for all that the competitive system implies of the private ownership of property and freedom in its use. Its purpose is the assurance of the capitalistic system, in short, without Socialistic or Communistic dilution but with controls which tend to correct the obvious abuses. Unfortunately for this definition, the economic experiments of the recent past have provided ground for belief that in any proposed regulation of competition lies concealed the ultimate purpose of governmental control by administrative fiat. This is of course, the antithesis of individualistic competition and implies its extinction. From this misconception the proposal to regulate competition as competition is properly defined, must be clearly and definitely distinguished,—and rescued.

I suggest that this misunderstanding would not have occurred or could not have been so easily adopted had our legal economics previously contained a definitive declaration of the competitive system and its funda-

mental requirements as a statement of public policy. What we have of a public economic policy derives from no considered judgment or decision of our own times and conditions. It exists by judicial inference from the English common law which is a mixture of ancient custom, only slightly affected by the early economic texts. In none of the anti-trust laws is there to be found a single economic definition or specific statement of an economic principle. Our economic jurisprudence is all a matter of judicial discretion, judicial deductions and assumptions. It was a light matter therefore to transfer the authority to make these deductions from one branch of the government to another. And to continue their discretionary character. Since this may be somewhat startling, may I refer to higher authority?

In the Northern Securities case, the majority of the Supreme Court evoked an hereditary relationship between the English common law and the Sherman law. And upon this judicial hypothesis, the Supreme Court declared that the purpose of the Sherman law was to maintain competition. To which Mr. Justice Holmes retorted with the simple statement that the law says nothing about competition. In which he was entirely correct. That the judicial inference drawn by the majority of the Court is not a sole or necessary conclusion is evident when one realizes that the private monopoly which the Sherman law prohibits is quite as obnoxious to Socialism or Communism as it is to capitalistic competition. In other words, an objection to monopoly does not necessarily imply a purpose to maintain the competitive system. And even if the inference be granted, what is the economic content or requirements of this competition which is to be thus maintained? It is cognized only in the judicial assumptions as interpreted by the body which drew the original inference. And this is all that we have of a public economic policy. We assume that this policy bears some recognizable relation to competitive economics as outlined by the text writers. But this assumption confuses and defeats us.

To illustrate what I have in mind, one example will suffice. The veriest tyro knows that the vital element of competitive economics lies in open markets to which all sellers and all buyers have equal access and in which they have equal rights. Nothing in our public policy requires such open markets or protects them. With reference to manufactured as distinguished from agricultural products, the open market is practically nonexistent. Under the delivered price and basing point systems, the market is closed to the buyer where the seller is and open to the buyer only where and when the

seller dictates. Our system of secret bids and secret prices, our denial of open price listing and selling which is the only practicable modern equivalent of the open market, makes true competitive conditions impossible. Meantime the judiciary defines the competitive system as an honorable struggle for advantage, a revelation which sends cold shivers up the economists' backs.

Consequently it seems to me that the basic premise of the proposal to regulate competition must be a statement of what competition is, what competition requires as an economic system. And having reached this understanding, it then becomes possible to postulate regulations, positive in requiring conformance with the system and negative in prohibiting deviations from the terms of the system. This, it seems to me, is an essential element in any new legislation on this subject. It is not difficult to put into a form of words. It would be more difficult to put into operation simply because we are so far removed in conventional practice from the methodicity which the competitive economics demands. Our economic development was not systematic but kaleidoscopic. Any systematic application of whatever type to our economic variations will be difficult. The process must be one of adjustment.

But if this course is followed, a public economic policy arises by act of Congress and no longer rests upon the inferences and assumptions of judicial discretion. And, which is quite as important, it thereby becomes obvious that the regulation proposed is that which is inherent in the ascertained terms of an economic system instead of an arbitrary control by administrative fiat. I suggest that a definitive and continuing public economic policy cannot be developed from either judicial or administrative discretion working from its present inferential basis.

Economic planning does not seem to me to consist of fortune telling. It does not predetermine a result in concrete terms and then shuffle and redeal the effects of prior maladjustments to conform with this momentary perception of the ideal. Economic planning I suggest, deals with causation, it seeks the source of maladjustment and endeavors to change the causative forces in order that a better result may follow. Just as the mathematician entrusts his result to the correct application of the mathematical principle and rules, so should the economic planner entrust the social result to the economic method. Thus his search is for an improved methodology and then for its effective implementation.

The key-note of this method I have already suggested. It lies in the statement of the economic re-

quirements of the competitive system about which we talk so glibly and comprehend so little. To this keynote the public economic policy in all its details, should be consistently related.

In approaching the subject of legislatively implementing this methodicity, it is necessary to differentiate sharply between two possible means of regulation. One is the authorization of industrial self-regulation within definitely prescribed limits or rather in conformance to definitely established standards emanating from Congress. And of course these standards for permitted self-regulation should be such as harmonize and properly implement the principle of the public policy. This type of regulation, while its authorization would extend to the whole of industry, should permit each industry to advance upon the outlined field just so far and so fast as the sense of its personnel may warrant. The degree of self-regulation then might vary as between industries for there would be under this method, no iron mould into which all industry must be poured and pressed to fit. But still all these degrees or stages of development in the regulatory advance would harmonize in their quality with the dominant economic policy.

By this method an additional advantage would be gained for the enforcement task is enormously lessened when each industry goes only so far in its regulatory efforts as it can get without an undue strain upon its membership. And within the permitted range, each industry should be able to choose the type of regulatory action which is suited to its own needs.

The implementation of this industrial self-regulation is permissive rather than prohibitory legislation. Congress should declare as a matter of public policy, that industry agreements of the character specified in the act, promote the public welfare. This definite authorization and declaration of public policy are necessary to avoid the constitutional question of delegated authority. They are also required as the foundation for the further declaration that violation of such regulations made to promote the public welfare, are to be prevented also as a matter of public policy and always in the public interest.

Heretofore in the absence of a public economic policy whose maintenance must be in the public interest, the public regulation of competitive practices has had no economic foundation. And public control has largely been defeated by the wide gap which exists between public and private remedial actions. But if a definite public economic policy is established, its uneconomic

violation may be clearly seen to touch both the public interest and the public welfare in no uncertain terms.

Under such legislation the governmental relation would be very simple. Administratively it would co-operate in the mechanics of regulation making, test the regulations when made by any industry for conformance to the legislative grant of power and approve or disapprove them accordingly. Regulations thus approved would become the law merchant for the industry which makes them. But the administrative body would exercise no regulatory or supervisory power on its own initiative. Industry would act or would not act within the permitted range of regulation and there the matter would rest until that industry should move of its own accord.

The alternative is a discretionary governmental supervision and control of industry. This may take either one of two forms. One type is specific legislation, a Congressional clarification either by way of extension or modification of the anti-trust laws. This process requires that Congress supersede the wide judicial discretion by which the anti-trust laws are presently interpreted and applied and make specific definitions of prohibited conduct. This was the method attempted in 1914, the complete failure of which produced the abortive Federal Trade Commission Act and the equally futile Clayton Act. The task is now as it was then, impossibly difficult.

The other type of possible governmental regulation is a modification of the Industrial Recovery Act. The Schechter case has shown what this modification must be. This type of legislation must be kept so far as Federal action is proposed, within the limits of interstate commerce, and Congress must either specifically authorize the industrial agreements or administrative regulations which are to be sanctioned or must provide standards of judgment by which the administrative agency and the courts of review shall be guided. There can be no wholesale dispensation of discretionary power. Control, you will observe, must be negative and consist of specific prohibitions. Regulation on the other hand, may be positive or permissive but whether it be self-regulation or administrative supervision, something in the nature of a public economic policy must come from Congress. Of these two regulatory alternatives, industrial self-regulation in conformance with a definitely stated public economic policy, seems to me clearly preferable. And I proceed upon this premise.

Passing from this fundamental issue, the next large question to arise is whether the regulation of competi-

tion is to stand alone or is to be combined as under NRA with a fixation of wages. Wholly apart from the constitutional obstacle which the Schechter case discloses, this combination even if attempted in the guise of code agreements, is impracticable and a sure source of ultimate failure. And the reason is quite simple.

The object of the regulation of competition is a changed state of competitive practice. This will be attained by a combination of voluntary and enforced compliance. Unless and until the government is ready and willing to enforce the labor provisions of a combined code agreement against labor as well as against the employer, the combination code is meaningless. For labor is now free to disregard the labor provisions of a code agreement at will. It has only to renew wage negotiations of its own volition and enforce its demands by strike whenever it sees fit to do so without regard for or deference to the code or the administrative agency. The combined code agreement is then disintegrated by act of one of the parties to it, into two distinct and unrelated elements. And when this happens, the whole theory of the combined code agreement is exploded. NRA did not last long enough to develop this result clearly but the beginnings of it as instanced by the separate industry labor boards and the growth of revision by strike pressure, were evident.

I do not mean by this argument more than appears on its face. As I have attempted to demonstrate elsewhere, the problems of wage rates, wage costs, the commodity price index and unemployment, cannot be solved in any such offhand fashion as was attempted under the Blue Eagle. Neither the desirable regulation of competition nor the adequacy of wage rates should be subjected to the processes of barter. Related these two problems undoubtedly are but their relation is that of each to the public welfare rather than of each to the other.

I have thus presented to you in broad outline, a new conception of the objective and method of an economic regulation of that economic practice which is called competition. It remains to consider its legislative implementation.

To give you an outline of all the details of a putative act embodying these ideas, is beyond the present purpose. But I will quote from a draft which I have prepared, a declaration of a public economic policy which will serve to illustrate what I have in mind.

It is hereby declared to be the public policy to establish and maintain the systematic use and practice of free competition in interstate commerce. The essential elements of this policy are free and open markets with equal rights of access or approach

thereto by all sellers and all buyers and with equal rights and privileges therein to all sellers and all buyers. The fairness and equity of the usages, methods, practices and expedients in approach to the market or in the conduct thereof are inherently a necessary and essential part of the establishment and maintenance of the systematic use and practice of free competition and therefore, the prevention of the use of unfair or inequitable usages, methods, practices or expedients in the approach to the market, or in the conduct thereof or with reference thereto, hereinafter referred to as unfair marketing methods, is hereby declared to be in the public interest."

This is intended to be broadly definitive of Competition as an economic system rather than a street fight. Such a declaration substitutes for the prior judicial inference, a legislative enactment which recovers the economic premises of the competitive system. As this declaration is in behalf of the public welfare, the maintenance of this system is properly in the public interest. I can not overemphasize the significance of this step though time will not permit the development of its vitality. I suggest merely that for the first time, it would introduce a definite and coherent objective into our legal economics.

Following this broad statement of principle, it is possible to reduce this policy to specific terms for the purpose of taking practices characterized by fraud, deception and misrepresentation out of the category of injury either to private persons or private property and as well out of the cloudy perception of public morals. As these are distinctly economic methods and objectionable publicly because of their economic effect rather than their moral quality, these methods should be flatly outlawed as violative of the public economic policy. Another quotation will illustrate how this may be done.

It is hereby declared that any and every act, action, usage, method, device or expedient in or in connection with the sale or offer for sale or inducement to purchase goods, wares, merchandise or service, which is characterized by fraud, deception, bad faith, or misrepresentation; the simulation of name, trademark, brand or label or the palming off of such simulations; fictitious or non-demonstrable guarantee or warranty; the representation that part of a combination offer is free; lotteries or inducements based on the element of chance or luck; fictitious bargain, fire or closeout sales; the sale or offer for sale of obsolete, used, worn, second-hand, reclaimed, repossessed, spoiled, damaged, imitation goods, wares or merchandise and second grade or factory rejects without clearly disclosing such fact to the buyer, and commercial bribery regardless of the consent of the employer, is inherently obnoxious to the maintenance of that system of free and fair competition upon which the public welfare depends, is injurious to the public welfare and is therefore declared to be an unlawful marketing method.

This also breaks new ground but until some such step is taken, these practices will not be prohibited per se but only under special circumstances and conditions. I have discussed elsewhere the fatal limitations upon the powers of the Federal Trade Commission in this field, which judicial decisions have imposed upon the Commission act. It is to remedy this defect that this provision would be specifically directed.

This second phase of implementing this public policy would lie in the enumeration and description of co-operative agreements by industry which are authorized by Congress. This is essential if an unconstitutional delegation of legislative authority is to be avoided. In common parlance, this would be a Congressional declaration that such agreements are reasonable, or to put it the other way, not unreasonable restraints of trade. And this, of course, would supersede the discretion now lodged in the Supreme Court with relation to the same subject matter. The enumeration of these regulatory agreements is too broad a subject for discussion here. It suffices to say that they should be consonant with the general economic policy and in specific application of it.

The underlying theory of this permissive legislation would necessarily be that the full exercise of the permitted powers in all industry would promote the common welfare. By making the grant in this form all questions of discrimination or preference as between industries would be avoided and all would have the equal benefit of the laws though all industries might not avail themselves at once of the full scope of the grant.

The preliminary declaration of public policy is particularly important when the question of enforcement of these voluntary regulations is reached. Since the making of the authorized regulations would be declared by Congress to promote the public welfare, their violation when made would also be contrary to public policy. From this premise it would follow that their prevention throughout the particular industry, would always be in the public interest.

To complete this program it would be necessary to establish a mechanism for the trade practice conference through which this voluntary regulation might be expressed. But this is a matter of detail and so forms no part of this presentation.

I realize only too well that this broad treatment of general principles leaves much to be desired. There are blank spaces in which the imagination falters for lack of details. But I have already trespassed upon your patience.

So far as you have grasped them it may well be that

you are not prepared to accept the conclusions which I have thus presented. That I can well understand because I have traveled a long and arduous journey to arrive at the position from which I speak. But I ask you to accept at full value the sincerity with which I submit these propositions for your consideration.

Discussion

Milton Handler.¹ As long as we deal with narrow, concrete issues, with business abuses such as false advertising, commercial bribery, adulteration of food and drugs, the remedies are reasonably clear and are within the realm of practical attainment. Similarly, if we limit ourselves to an indictment of the present order, to a catalog of the major causes of dislocation, and to general prophecies of future trends in the relations of government and business, we are on safe grounds and our comments can be concrete and pointed. But as soon as we begin to recommend specific changes, or to remove the causes of disorganization, we are like the Bronx landlord and Tom Mooney.

Mr. Person² tells us that the trend is in the direction of increased governmental control and I agree wholeheartedly. Mr. Stuart Chase has recently written a book in which he not only shows the trends but indicates the extraordinary extent to which such intrusion has proceeded. About a year ago, I made a detailed study of the legislation in New York affecting the conduct of business and I was amazed by the multiplicity of business regulations already on the books.

The speakers have made so many telling points and have covered their subjects so admirably, that I am sure they will pardon me when I say that the questions their papers suggest stimulate my interest more than those which they covered.

I want to know more about the details of the government controls which Mr. Person envisages. We all know that the present system operates badly, but will the one which he contemplates work any better? Mind you, I am not opposing his thesis or his aims—I merely suggest that I would like to know more about his analysis and the details of his program and I wish he had had more time, which of course he hasn't here, to develop his ideas. How does he propose to handle the problem of debts which he mentions—or the balancing of agricultural and industrial prices and income—or the rigidities

¹ Columbia Law School.

² The address by H. S. Person will be printed in the March issue.

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Time Studies in Commercial Research Work¹

By FRANK M. SURFACE
Standard Oil Company of New Jersey

THREE years ago I had the honor to speak before a joint meeting of the Taylor Society and the American Marketing Society on the subject of Allocating Marketing Costs to Individual Commodities. At that time I pointed out that if it were possible to parallel in the field of marketing, the technique of Frederick W. Taylor as applied to production management, it might well mean a revolution in the methods of distributing merchandise. I still believe that it is entirely possible to develop practical methods of allocating marketing costs to both commodities and to customers and that in this field lies the greatest promise of real advancement in marketing technique.

During the past three years in my work with the Standard Oil Company of New Jersey many other problems of a more pressing nature had to be taken care of. But in recent months I have been able to make some headway on this question of cost analysis. The results so far obtained are only preliminary to a more thorough analysis which we are now undertaking.

As we conceive it the basis of much of our cost allocation is found in comprehensive time studies of our operations. It is to these and some of the ways in which we are using them that I would like to call your attention today.

Before going into these I should perhaps remind you that the marketing operations of an oil company consist of both wholesale and retail distribution. Refined petroleum products are shipped from refineries or large terminals by tank car, barge or other means to so-called bulk plants which are wholesale establishments. From these bulk plants, liquid bulk products are distributed by tank truck to (1) Company operated service stations; (2) to dealers who buy at wholesale and resell and (3) to commercial consumers who have their own storage and buy at wholesale for use in their own trucks or other vehicles. Roughly, somewhat less than one-fourth of our business is handled through our own retail outlets and the bulk of our wholesale business is to dealers.

As opportunity offered we have been making time studies both in our retail service station and in our bulk plants. In making these time studies we use a time checker for each individual employed in handling com-

modities. The time checker is provided with a stop watch and special forms on which to record the operation of the man he is checking. By the use of code numbers for the things we want chiefly to record, we reduce the amount of writing to a minimum. The checker starts when the man goes to work in the morning and accounts for his complete time for the day. We continue all time checks for a full week since this has proven to give us as accurate results as longer checks.

Such time studies while they give us the basis for allocating salaries and wages, also throw light upon a multitude of operating problems and in our own case have been extremely helpful in shaping executive policies.

I should like to indicate a few of the findings from some of these studies which, as examples, will indicate their usefulness. For example, in a time study of twelve Company operated service stations, we checked 13,744 customers. The number of man hours put in by the service station personnel was 3,888 or 3.53 customer served per man hour. The average sale of motor fuel per customer entering these stations was 4.66 gallons. Sales of motor oil amounted to 2.4 gallons per 100 gallons of gasoline. The average sale per customer amounted to 90 cents less tax or \$1.11 including tax. From this you can see that we are pretty good tax collectors for the Government.

Approximately 91 per cent of the customers entering these stations came in passenger cars. The remainder were commercial vehicles, motorcycles and a few on foot.

Nearly 85 per cent of the cars entering were driven by men; 14 per cent by women and 1 per cent by chauffeurs.

Fifty and nine-tenths per cent of the customers get out of their cars and two-thirds of these check the attendant's operations.

Thirty-one per cent of the customers remain in the station less than two minutes while 43 per cent remain from two to four minutes. Thus 74 per cent stay less than four minutes which means pretty fast service. This 74 per cent of the customers bought 72 per cent of all the gasoline sold; 18 per cent of the motor oil and accounted for 55 per cent of the dollar sales.

Only 30 per cent of the time of the station personnel

¹ Presented at a meeting of Federated Management Societies in cooperation with the American Marketing Society, New York, December 6, 1935.

is productive *i.e.* used in the delivery of products or in the performance of services for which payment is received. Approximately 11 per cent is in free services and other promotional activities while 59 per cent is non-productive. This latter includes care of the station, record keeping, idle time (15 per cent) and any other time.

Eighty-five per cent of the customers entering these stations made a purchase before leaving. Some kind of free service such as cleaning the wind shield, checking the water, etc., was given to 76 per cent of the customers entering the station.

This list which might be greatly extended, indicates the nature of the information which is available from such studies.

Similar studies at bulk plants have thrown a great deal of light on problems of truck routing, the importance of size of delivery, the need for adequate storage at retail outlets, the importance of a proper layout at the plant, the effect on delivery time and thus on costs of adding new products to the line and a host of other problems. The cost of these studies has been paid for several times over in the influence which they have had in reducing obviously unprofitable operations.

I want to refer here to just one phase of the use of these time studies in the allocation of costs. As indicated above, we deliver from our bulk plants both to Company stations and to wholesale outlets. The latter includes both dealers and commercial accounts. Inasmuch as our Company stations are usually located in towns or cities closer to the bulk plants than the average wholesale outlet and also since they are usually larger outlets with adequate storage, it ought to cost less per gallon to deliver products to company stations than to wholesale customers. The problem we had to determine was how much it costs us to deliver to each type which we may distinguish as retail, meaning Company stations and wholesale, including all other.

Our Accounting Department gives us the total tank truck expenses for a given territory during a given period. This is divided between wages, maintenance of trucks, products used, etc. The problem was to divide this expense between retail and wholesale business on an equitable basis.

In the example given below, the figures do not represent actual data from any one of our territories but these assumed figures will illustrate the method which is all I am trying to give here.

The basic data for the allocation of these delivery costs on bulk liquid products consists of a time study of

tank truck operations which includes a record of everything the drivers do during a complete week together with the speedometer mileage between each stop. These time studies are made at from three to six bulk plants in a given territory. These plants are picked as representative of different sizes and conditions in the area.

For purposes of this discussion, we may assume that such time records give the following:

Time of Tank Truck Driver

	Per cent of Total Time
Traveling time	35
Time with Customer	40
Care of truck	10
All other time	15
Total	100

The time with the customer included contacting customer, sticking tanks to determine amount on hand, delivery of product, making out delivery ticket, collecting money or getting signature and any other time spent in conversation, solicitation, etc.

We may assume here that the tank truck expense in a given territory for a given period was \$100,000 divided as follows:

Tank Truck Expenses

Wages	\$60,000
Truck Expenses	36,000
Other Expenses	4,000
Total	\$100,000

Wages are, of course, the wages of the drivers. Truck expenses include maintenance and repairs, gasoline, oil, tires, etc., used, while other expenses include supplies such as faucets, buckets, hose and any other sundry expenditures.

For the same period we may assume that the deliveries of bulk liquid products amounted to 22,000,000 gallons divided as follows:

To Retail Stations	6,000,000 gallons
To Wholesale Outlets ...	16,000,000 gallons

Twenty-two million gallons with a total delivery expense of \$100,000 would give an average expense per gallon of \$0.0045.

The first problem in expense allocation is to divide the total expenses into groups, each of which may be assumed to vary according to some factor which can be

measured. Our specific problem is to divide expenses between wholesale and retail outlet. It is obvious that there are certain costs such as the time of loading the truck which would be the same per gallon whether the product went to one type of outlet or another. Such costs can be divided between wholesale and retail on the basis of the number of gallons delivered.

Other costs will depend on the distance traveled and can be allocated either on traveling time or mileage.

Still other costs will vary with the amount of time spent with the customer per unit of delivery.

We may divide our \$100,000 of expense into these three groups as follows:

Group 1—Expenses varying with mileage:

Traveling time (35% of wages) ...	\$21,000
Care of Truck (10% of wages)	6,000
Truck Expenses (Total)	36,000
Total	\$63,000

Group 2—Expenses varying with time spent with customer:

Time with customer (40% of wages) \$24,000

Group 3—Expenses varying with gallonage:

All remaining expense \$13,000

With regard to group 1 expenses, we found from our time study that the truck serving retail stations traveled say 200 miles and delivered 40,000 gallons or at the rate of five miles for every 1,000 gallons.

On the other hand, trucks serving wholesale outlets may have traveled 1,500 miles and delivered 100,000 gallons. This is at the rate of fifteen miles per 1,000 gallons.

The ratio of miles per 1,000 gallons delivered to retail and wholesale outlets is thus as five is to fifteen or one to three.

Now, if we weight this ratio with the total gallons delivered in the entire territory to each type of outlet, we will obtain a weighted expense ratio on which we can divide this group of costs between retail and wholesale. This may be done as follows:

	Total Gals. Del'd.	Gallons X Ratio	Expense Ratio
Retail	6,000,000	1	6,000,000 1
Wholesale ..	16,000,000	3	48,000,000 8

The total of \$63,000 of expenses varying with mileage (Group 1) may now be divided on the basis of 1 to 8. Thus:

	Expense Ratio	Total Expense
Retail	1	\$ 7,000
Wholesale	8	56,000
Total		\$63,000

Turning now to Group 2 expenses of \$24,000 which vary with the time spent with the customer, we have from our time study:

Trucks serving retail outlets spent 2,000 minutes with the customer and delivered 40,000 gallons of products. This is at the rate of fifty minutes per 1,000 gallons.

Trucks serving wholesale customers spent say 10,000 minutes delivering 100,000 gallons or 100 minutes per 1,000 gallons.

The ratio of retail to wholesale in time with the customer per unit of product is thus one to two.

Weighting this ratio with the total gallonage as before, we have:

	Total Gals. Del'd.	Gallons X Ratio	Expense Ratio
Retail	6,000,000	1	6,000,000 1.00
Wholesale ..	16,000,000	2	32,000,000 5.33

The \$24,000 of expense in group 2 may be divided as 1.00 to 5.33 thus:

	Expense Ratio	Total Expense
Retail	1.00	\$ 3,789
Wholesale ..	5.33	20,211
Total		\$24,000

Group 3 expenses of \$13,000 may be divided simply in proportion to the total gallons delivered to each type of outlet as follows:

	Total Gals. Del'd.	Ratio	Total Expense
Retail	6,000,000	1.00	\$ 3,543
Wholesale ..	16,000,000	2.67	9,457
Total			\$13,000

We are now ready to summarize these expenses for the three groups and determine the expense per gallon

for delivering bulk products to each of these types of outlets.

	Retail	Wholesale
Group 1 (Mileage)	\$ 7,000	\$56,000
Group 2 (Time with Customer) .	3,789	20,211
Group 3 (Gallonage)	3,543	9,457
	<hr/>	<hr/>
	\$14,333	\$85,668
Gallons delivered	6,000,000	16,000,000
Expense per gallon	\$0.0024	\$0.0054

While this is a relatively simple method of expense allocation between types of customers, it has so far as our experience has gone, given consistent and apparently reliable results. With slight adaptation it can no doubt be used with many other kinds of commodities where similar problems arise.

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of prices which Means' study has brought to light—or the unemployment problem? I gather that he favors a regime of economic planning but is he willing to implement planning with the regimentation which it necessarily entails? Every one will concede the attractiveness of a stable and smoothly functioning economic system, but will economic planning provide us with one? Is planning possible under a regime of private profit? Is planning compatible with the requirements of the Federal Constitution? Can planning succeed without a rigid control of money, credit and investment? Can the activities of a private banking system be co-ordinated with those of a controlled industry? What account will be given to changing standards and habits of consumption, to changes in productive methods and distributive processes? Doesn't planning imply a regimentation of consumption habits? Doesn't it inevitably put an end to economic liberty? What system of prices is employed under a regime of planning? Can planning on a national scale succeed in a world of international trade anarchy? And who in government will exercise the new powers? While the bugaboo of bureaucracy inspires no terror in my foolish heart and mind, I cannot forget that General Johnson conceived of himself as an apostle of economic planning.

So, too, I applaud Commissioner Gaskill's strictures on existing institutions of government control, but I am somewhat troubled by the details of his proposal. As hard as I try, I am unable to find his legislative declaration of policy any more enlightening and specific than

those in the Sherman Act and the ill-fated N.R.A. I cannot see how his statute eliminates the element of administrative discretion, nor in truth, how it could be eliminated. Nor am I entirely clear as to what he proposes to do in these industries in which there is no longer any competition to maintain or improve. I may be mistaken, but his proposal seems to call for an improved F.T.C. and N.R.A., with detailed prohibitions of unfair and uneconomic competition and considerable lee-way for self-imposed industrial agreements. What assurance do we have that these agreements will be animated by a more disinterested and unselfish outlook than that which dominated the N.R.A. codes? Intelligence and vision cannot be legislated into being. Of course, if we retain the competitive system, we should fumigate and rid it of the verminous abuses that disgust all decent people. But will such a purified and rationalized competitive system avoid the vicissitudes of the business cycle and remove the maladjustments which Mr. Person has so eloquently reviewed? I hardly think so.

I naturally favor such purification. I applaud Mr. Person's statement that our present Constitution is an economic anachronism. I participated in the drafting of the new Food and Drug Act and the absurdity of the present division of powers among the states and nation was dramatically brought home to me. The national government can merely regulate the illicit traffic in poisonous and worthless quackeries after it has begun and the states, which possess the reserved power to control production, will not and cannot. The clause in the Constitution which precludes effective Federal control stands in the way of adequate state regulation. If State A enacts decent legislation, an exodus of manufacturers ensues to State B with its lowered standards and from State B, the exiled quacks can flood A's markets with their wares. You are familiar with the same situation in the case of our corporate and labor laws. Those who gloat over the invalidation by the Supreme Court of most of the New Deal laws may find the Federal Government without power in the next emergency to establish even an R.F.C.

I have not the time nor the ability to say what the Federal Government could or should do with the powers which it will and must have. I agree with Mr. Person that in these fields in which competition works fairly well, there is no occasion for immediate change. I am somewhat sceptical whether, in view of the dismal failure of utility regulation, monopoly can be successfully controlled. And whether the hybrid system of competi-

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The Larger Aspects of Industrial Engineering¹

By WALTER RAUTENSTRAUCH

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THE engineering profession in America has failed to render a most important public service. It has failed to marshal the skills and experiences which it has acquired in the organization and management of thousands of industries and bring them to bear on the problems of our National Organization. This is due to a number of causes, the chief of which is, that the rapid advance of the physical sciences has so engrossed the engineer's attention that he has become almost exclusively a technician applying the principles of science to machines and devices. Another reason is that he has been employed by industry to assist in meeting the competitive conditions of the market place and thus has come to measure the results of his work in terms of private enterprise seeking profit and fortune through production and trade by hiring for wages the mass of human labor.

Of course it is part of his professional duty to design and build machinery, and to manufacture the goods and provide the services by which we live; and well may he be proud of what he has created. If he cannot do these things, he has no right to be called an engineer, for that is part of what an engineer is supposed to do. But if that is all he can do, he is more properly classed as a technical expert. For in addition to applying his technical skills, the true engineer must concern himself with the use of the devices he has created in the service of and for the good of mankind.

To this end he must have a definite social philosophy, without which he cannot interpret the great social and economic movements brought about by the very devices he has created. All too frequently engineers are trained in our colleges by narrow minded, even though highly skilled technical experts, who are unsympathetic with the great and important fields of human interest such as philosophy, religion, literature and art. After graduation they find positions in industry and apply themselves almost exclusively to detailed technical problems. They must, of course, make a living and they must do it by solving technical problems. But they should also be learning to live a life, to integrate their experiences into a philosophy of life, to orient themselves in the pattern of our national culture. With America facing the great

problems of reorganization and management of the processes of civilization, the engineering professions stand helplessly by, little realizing what it is all about. What should be the important profession of Industrial Engineering has become a group of skilled specialists concerning themselves with the details of shop and office routine.

America is faced with the greatest opportunity in its history because it is faced with the problem of the reorganization of the most powerful group of forces which civilization has ever brought forth. If it proceeds along rational, intelligent lines toward its solution, it can build the greatest national culture the world has ever seen. If we continue to deceive ourselves into believing that prosperity is returning by our present methods, we need only expect the forces of corruption to lay their withering hands on the spirit of mankind.

The engineering professions can render no greater public service than to unite in an endeavor to bring reasoned and sound judgment to the problems of our national life; and to demand, in the name of common sense, the adoption of that type of organized procedure which will grant to every individual the freedom to participate in the processes of civilization and to receive fair and just claims to the goods he assists in producing.

In order to make a substantial contribution to an understanding of the problems of our industrial economy the members of The Society of Industrial Engineers and members of other engineering societies as well, should devote themselves to investigations of the following topics:

1. The establishment of units, methods and means of measurement of industrial, economic phenomena. Until we establish standard terms, by which we can converse intelligently about our industrial economic problems, we will be hopelessly lost in any attempts to establish clear concepts of the problems we are trying to solve. No scientific progress in any field of subject matter can be hoped for until a right beginning is made and that beginning must be based on scientific methods of measurement. Therefore sufficient progress should be made toward the solution of this first problem before the others are undertaken. Unless we have a common language in which to express ourselves we cannot communicate our ideas intelligently.

¹ Presented at a meeting of the New York Chapter of The Society of Industrial Engineers, New York, October 8, 1935.

2. The economic characteristics of processing and production machinery and the development of standard bases for comparison. Mechanical, electrical, chemical and other engineers are concerned primarily with designing and building the machinery of production. Many of these machines are applicable to the same class of work, but with different economic consequences. Therefore the industrial engineer should evaluate these machines in such a way that comparisons may be made in terms of cost per unit of output at varying rates of production. Until some standards for such comparisons are evolved there will exist considerable confusion in judging the relative economic worth of productive equipment.

3. The economic characteristics of productive enterprises by units and by groups, and the development of standards for their comparison. Industrial enterprises have definite characteristics in costs per unit of output at varying volumes of production, in range of sales over which earnings are made, and in other particulars. They vary among units in the same industries and between industries. In order that industrial entities may be evaluated in economic terms, certain units and methods of applying these units must be devised and accepted.

4. The development and application of statistical methods for the measurement of the results of processing and of management. The excellent papers presented at the semi-annual meeting of the A.S.M.E. in June, 1935 are indicative of the kinds of statistical measurements which should be developed and more broadly applied.

5. The discovery and formulation of principles of internal plant organization. This may be stated as the problem of internal integration. The application of such principles when discovered, will serve as bases of measurement of economic waste in industrial operations. They should also serve as guides to the introduction of organized procedures for producing our goods at lower cost.

6. The discovery and formulation of principles of external organization or the integration of the unit with the industry as a whole and with the national economy. The discovery and promulgation of such principles should go far toward bringing about a better understanding of the relationship of government to business, and should be the foundation upon which legislation may be based to give each unit within the industry as a whole the greatest freedom of action for the public good.

7. The discovery of the principles of product design from the standpoint of the economy of production. Considerable attention has been given to this subject in the case of specific products but there still remains to be discovered certain basic principles upon which procedure in product design may be based.

8. The discovery of the principles of plant design to accomplish the optimum economic advantage. The design of power stations is based upon such principles but there has not yet been developed in the field of manufacture the same sort of procedure as obtains in the power field.

9. The discovery of the general principles of organized procedures and particularly the methods by which changes in objectives and programs are brought about at minimum cost. All serious students of our national economy are convinced that some change in the organization and management of our national industries as a whole is imperative. Unless the engineer assists in bringing about a rational understanding of how these changes may best be made, society will always be subject to the disastrous effects of misguided unintelligent leadership.

10. The design of the financial structures of corporate enterprise. It is not generally realized that the forces which impinge on the operations of industrial enterprises may be directed toward more desirable economic ends through proper design. An understanding of these principles which should be embodied in the design of the financial structure of enterprise will enable us to understand why the relative claims of capital and labor to the goods produced are now in unworkable proportions.

11. The principles of design of the whole corporate enterprises from an economic viewpoint naturally follow from these principles which relate to the detailed parts such as the equipment, the financial structure, the internal organization, and the external organization. These principles need to be set forth as an organized body of knowledge so that the design of a business enterprise as an economic venture may be prepared in much the same manner as the functional designs of engineering apparatus are prepared.

12. The principles of operation of our national industrial economy with particular reference to the types of organization and methods of management which assure the maximum probability of a stable and sustained operation. What are our national objectives? How are they arrived at? How is the program of action formulated by which it is hoped to accomplish the national

objectives? How is the program carried into effect? In what particulars do the organization structures and the methods of management violate the fundamental principles of an organized procedure? In what particulars do they accord with proven principles?

13. The influences of industrial and commercial practices on the citizen. How do these practices affect motivation? How does the environment created by these practices react on character and personality?

If it should be argued that these problems lie in the fields of sociology and political economy and are no concern of the engineer, let us remind ourselves that no such arguments are put forth in the case of the physical and chemical sciences in their application to engineering practices. The engineer does not hesitate to study the physical and chemical principles which underlie apparatus design. Indeed many basic researches are being conducted by engineers in these fields. Why then should the engineer fail to avail himself of the work of economists, and the students of the social sciences, when their work relates itself to the problems of organization and management.

All engineering problems are problems of probability. The engineer estimates the *probability* of an event. The more knowledge he has of the forces, their characteristics and relationships, with which the problem is concerned, the better he is able to estimate the probability of an event. Why does the mechanical engineer study the Quantum Theory, if not for the purpose of estimating the probability of certain eventualities in the performance of heat transfer apparatus? Does he dismiss the problem with the excuse that it belongs to the physicist? Why does the electrical engineer study abstruse mathematical theory in preparation for the investigation of electrical transmission problems? Why does the civil engineer work with the physicist on the problems of the elastic behavior of materials?

When the industrial engineer grasps the nature of his problems, he too will be working with the economist, the sociologist, the psychologist, the statistician and other specialists whose interests are closely allied to the problems of organization and management.

Just so soon as the leaders in the Industrial Engineering movement present a program of action which will challenge the imagination of the oncoming generation of young engineers, will they find adherents to their cause.

"Where there is no vision, the people perish," is just as true for professional societies as for nations.

The advance of technology has brought with it the great problems of gearing the machine to an economic

process which will advance the cause of civilization. These problems challenge the skills of the engineering profession.

Will we accept that challenge? The greater usefulness of the engineer to society may depend on the answer to this question.

(Continued from page 24)

tion, controlled monopoly and government ownership, which he suggests, will give us economic stability is something no one can predict. I have my doubts, but I am not unwilling to try. But at the very least, I believe government should take over our basic natural resources, so that if failure continues to be our lot, we shall have the wherewithal to start again. Once private enterprise has wasted all our resources, not only will the competitive system be doomed but every substitute system with which we might experiment.

In the meantime, despite all the talk about under-consumption and the dependence of industry upon mass purchasing power, our large companies are beginning to make handsome profits, the Congress of American Industries espouses the Jeffersonian theory of states' rights and the post Adam Smith doctrine of laissez-faire, and ten million unemployed continue to stalk the streets in idleness.

BOOK REVIEWS

Management of an Enterprise. By C. Canby Balderston, Victor S. Karabasz, and Robert P. Brecht, Prentice-Hall, Inc., New York, 1935, pages xiv, 470. (\$5.00.)

"Management of an Enterprise" is a recent addition to the literature of management. Its authors are members of the faculty of the Wharton School of Finance and Commerce, University of Pennsylvania. While the purpose of the text is "to provide, for students and business executives, a well-balanced treatment of management essentials," its scope is less broad than its title suggests. It deals with industrial management, and more specifically with the management of factory operations. In developing their subject, the authors proceed "from the tangible to the intangible. It begins with product and with physical facilities; it ends with organization and with personnel relations."

Chapters I, Business Management: Its Place and Nature, and II, Profits and the Factors Underlying Management Decisions, lay down certain general concepts concerning management and the factors affecting its application. Chapter III, Product Design, takes up the problem of the product from the standpoint of economics rather than mechanics. It discusses briefly, and in general terms, the increasing importance of esthetics in design,

cost predetermination, the co-ordination of engineering and other operative functions, product simplification, diversification, and similar problems. Chapter IV deals with the setting of selling prices.

The next two chapters deal, in non-technical terms, with certain physical factors that enter into and condition the performance of directly productive functions. Chapter V, Provision of Physical Facilities, takes up such problems as the selection of equipment, plant layout, and material handling. Chapter VI discusses power, heat, light, and ventilation. The problems relating to the provision and control of these factors are treated simply, and in a fashion that should give the inexperienced reader a general understanding of them that is reasonably accurate.

Chapter VII, Output and Operating Standards, considers problems that have to do chiefly with time and motion study, leading to the establishment of production standards. The obvious reason for the location of the chapter is the dependence of standards of performance and procedure on standards of condition. There are, however, important relations between production standards and production control, standard costs, personnel, and other functions, that are not brought out. The reader may feel also that such important subjects as fatigue and delay allowances, the use of standard time relationships, and perhaps some others, are treated too briefly and concisely. Nevertheless, the chapter gives a satisfactory general discussion of the subject. In Chapter VIII considerable attention is devoted to the problem of incentives. A distinction is made between financial and non-financial incentives. The more important individual incentive plans for employees are discussed with a minimum of detail. The principal considerations in the application of individual incentives are discussed. Group bonus for operatives, bonus plans for minor executives, profit-sharing for higher executives, and similar problems are taken up. The chapter gives a good summary of the subject. However, fifty-two pages are devoted to it, while only thirty-eight are given to the subject of personnel. In consequence, some question regarding the matter of balance may be raised.

The next four chapters deal with technical staff functions in the manufacturing organization. Chapter IX, Inspection to Maintain Standards of Quality, gives a good but brief statement of the principles and problems of quality control. It is based largely on conditions in metal working industries. The treatment of the maintenance function, given in Chapter X, Maintenance of Standards of Plant and Equipment, seems inadequate, even for an elementary text. Six pages, exclusive of illustrative standard practice instructions and problems, are given to it. Chapter XI takes up the function of purchasing. The reader may have some difficulty in getting a tangible conception of the characteristics and requirements of purchase or-

ganization and procedure. However, it gives a good general, non-technical summary of the problems and policies of industrial purchasing. Chapter XII, Control of Inventories, gives a discussion of the subject that, for the most part, is quite satisfactory. It includes some discussion of stores functions that is inadequate. Furthermore, it does not distinguish between problems of inventory control under continuous and intermittent conditions of manufacturing.

The same thing can be said of Chapter VIII, Planning and Control of Production, Clerical, and Sales Operations, inasmuch as little analysis is made of the distinguishing differences between the problem of control with intermittent and continuous manufacturing. The discussion gives a good orthodox treatment of production control, based largely on conditions of intermittent manufacturing. Sales control is treated principally from the standpoint of the co-ordination of production and sales activities. Chapter XIV, Uses of Budget and Cost Data to Secure Control, is very good.

The discussion of "Organization as a Means of Direction and Control," given in Chapter XV, is reserved until the end of the book. Organization problems are "at once the most intriguing and the most difficult of all phases of management," because of their intangible nature probably. Despite this fact, the discussion is limited to a single chapter of twenty-six pages. Inasmuch as the principles of organization are fundamental to the problem of management, a more generous allotment of space might have been justified. As far as it goes, however, the discussion is very good, bringing out some of the more modern principles and points of view. The final chapters, XVI and XVII, deal with personnel management. They give a general discussion of various personnel and labor relations problems.

While the authors have, quite evidently, a definite philosophy of operating control, they have failed to make a definite, consistent, logical statement of it at any point. The discussion of organization cannot be considered to give it. Specific principles, points of view, and general methods of attack, relating to control, are presented at various points throughout the book. But no well-synthesized, fundamental philosophy of control is given. Yet it is quite as necessary for an understanding of management, as is a basic philosophy underlying any other general phase of management. This appears, consequently, to be a serious lack in an elementary text that deals largely with the control of industrial operations.

As a whole, however, the book is a good general treatment of industrial management. It should serve its stated purposes adequately by giving the student a satisfactory introduction to management essentials, and the mature executive a basis for a review of his reading and experience. By RALPH C. DAVIS, Consulting Industrial Economist, Columbus, Ohio.

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